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## DISTRIBUTION, CHROMOSOMES, AND TAXONOMY OF PARTHENICE MOLLIS (COMPOSITAE)

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*Parthenice* is a little-known genus native to southern Arizona and northwestern Mexico. Its single species, *P. mollis* A. Gray, is a rank-smelling, weedy annual bearing a superficial resemblance to *Iva xanthifolia* (marsh elder).

In 1851, Charles Wright made the first known botanical collection of *P. mollis* near the Mexican town of Santa Cruz, Sonora. Since that time the plant has been rather sporadically collected in Arizona as well as in several states in Mexico (fig. 1). In addition, *P. mollis* has been reported from New Mexico and Colorado in several western United States floras. Weber (1966) stated, however, that he was unable to verify the report of *P. mollis* in Colorado and suggested that the record should be rejected. The report from New Mexico also seems doubtful; there are no supporting records in herbaria of that state. It is interesting to note that the type specimen bears the handwritten inscription "collected in N. Mex.," which may have been interpreted to mean New Mexico instead of northern Mexico thereby giving rise to the report from that state.

In Arizona, the Ajo Mountains represent the western limit of distribution; the Patagonia Mountains limit it to the east and the Tortolito Mountains are the most northern site. The rather colonial populations

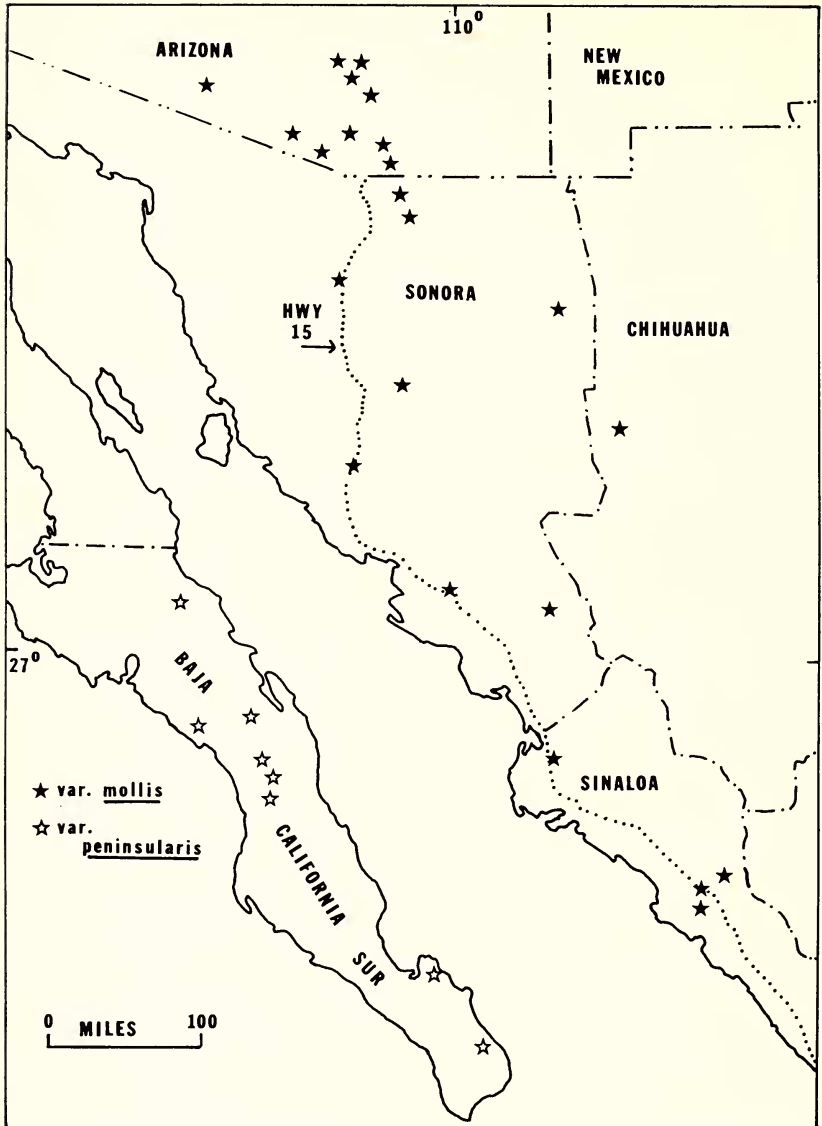


FIG. 1. Documented distribution of *P. mollis* var. *mollis* and *P. mollis* var. *peninsularis* in the southwestern United States and northwestern Mexico.

are most frequently found along washes or roadside embankments having a distinct southern exposure. In Mexico, I found it to be a conspicuous roadside weed from Nogales, Sonora, to Culiacan, Sinaloa. North of Hermosillo the species can be found on hillsides and in washes associated with west and north flowing river basins of the Rio Magdalena and the

Santa Cruz. South of Hermosillo it appears to be restricted to roadcuts and *milpas* mainly near Highway 15. In Baja California Sur, *P. mollis* has been collected in dry lake beds or *playas* and arroyos.

*Parthenice* is essentially a plant of the Sonoran Desert in sense of Shreve and Wiggins (1964). Frequently found in the Upper Sonoran Life Zone at 950 to 1400 m (3,000 to 4,500 ft), it also occurs at sea level near Guaymas, Sonora. Few data are available for elevations of *Parthenice* in Baja California Sur; one collection (*Carter 5050*) indicates an elevation of 360 m (1,200 ft) near San Javier.

#### CHROMOSOMES

Good meiotic figures were obtained from aceto-carmine squashes of pollen mother cells from young florets whose stamens possessed no yellowish color. A modified Carnoy's solution (chloroform:ethanol:acetic acid, 4:3:1, v/v) was used for killing and fixing. Collections made between 8:30 and 9:30 a.m. gave the greatest number of dividing cells, although figures could be obtained at any time of day. Counts from plants grown in the greenhouse at the University of Arizona indicated  $2n = 18$  II for *P. mollis* var. *mollis* near Tucson, Arizona. Dr. T. F. Stuessy and Dr. D. J. Keil have the same count from two Mexican populations (pers. comm., 1975). Chromosome vouchers (marked \*) are cited with representative specimens. [Note added in proof: Urbatsch (Southw. Naturalist 20:283-285. 1975) reported  $2n = 18$  II for *P. mollis* (Baja California, ca 1 mi NE of San José de Commandú, *Urbatsch 1202*, TEX).]

#### TAXONOMY

Gray (1853) considered *Parthenice* closely related to *Parthenium* (guayule) in the Melampodiinae (Heliantheae). He distinguished *Parthenice* from *Parthenium* by the former's deciduous and less ligulate ray corollas, reduction of the paleae of the disk to minute rudiments, and lack of a pappus.

Since 1853 little has been done to alter the taxonomic position of *Parthenice*. Baillon (1882) gave *Parthenice* and *Aiolothea*, a name of a scarcely known genus from San Luis Potosí, as synonyms of *Parthenium* yet recognized them as sections of that genus. No new nomenclatural combinations were made nor was any justification given for such a treatment. Rollins (1950) pointed out that the differences between these genera are so apparent that no modern taxonomist would consider them congeneric. Rzedowski (1968) reviewed material identified as *Aiolothea* and found it to be *Zaluzania* (Verbesininae).

Although *Parthenice* has been traditionally placed in the Melampodiinae, a taxon that Gray (1884) and others (see Stuessy 1973 for a review) regard as artificial, its true affinity has not yet been established. Bentham (1873) suggested the intermediate nature of the genus in his frequently quoted passage wherein he relates the Anthemideae with the Melampodiinae through *Parthenice*.

Work by palynologists has led to other speculations. Wodehouse (1935) relates *Parthenice* to Ambrosiinae (Heliantheae) because its pollen possesses a combination of characters that make it appear to be an ideal prototype for that subtribe. Pollen studies with the electron microscope (Skvarla and Larson, 1965; Skvarla and Turner, 1966) substantiate the work of Wodehouse only in part. Pollen of *Parthenice* appears to be the prototype for only certain members of the Ambrosiinae. Skvarla and Turner (1966) conclude “. . . *Parthenice* is not an easy genus to place and it might be that the genus, phyletically speaking, stands somewhere within the aggregate triangle Heliantheae-Ambrosieae-Anthemideae”.

In apparent contradiction to palynological data, anatomical data derived from study of embryo sac development and stem anatomy substantiate the relationship between *Parthenium* and *Parthenice* (Sauck, 1969). Therefore, a true picture of the position of these genera may not be obtained without an examination of data from many sources.

*Parthenice mollis* is treated here as being composed of two varieties that may be readily distinguished by the length of the pales that are attached to the achene (fig. 2). In material from Arizona, Sonora, Sinaloa, and Chihuahua, the pales are longer than the body of the achene, while plants having achenes with pales shorter than the body of the fruit are confined to Baja California Sur. This treatment was suggested to me several years ago by Miss Annetta Carter who also proposed the name “peninsularis” for the plants from Baja California Sur.

PARTHENICE MOLLIS A. Gray, Smithsonian Contr. Knowl. 5(6):85-86.

1853. TYPE: Mexico, Sonora, Santa Cruz, mountain ravine, Sep 1851, *Charles Wright 1208*. (Holotype: GH)

Plants aromatic, cinereous-puberulent erect annuals to 2 m. Stems normally unbranched except in the inflorescence. Leaves various, alternate; those below the inflorescence triplinerved, ovate to deltoid, long petioled, some with lamina decurrent on the petiole for several centimeters, toothed to coarsely crenate, lower leaves becoming quite large, up to 30 cm long; leaves of the inflorescence smaller, 1-7 cm long, ovate-lanceolate, toothed to entire. Cotyledons small, 1 mm in diameter, simple, glabrous, ovoid, petioled at maturity. Capitula hemispherical, numerous, paniced, sessile or pedunculate, greenish-white, densely glandular. Phyllaries in two distinct series, the outer series 5, ovate, herbaceous, overlapping, somewhat reflexed with age, the inner series 8, hyaline, broadly ovate to nearly round, distinctly cupped to fit the achene but not fused to it, deciduous. Receptacle convex, paleaceous with two types of pales; those associated with the ray flowers coriaceous, linear, purple mottled, curved at the apex, deciduous and attached to the achene at maturity; those associated with the disk flowers minute, conical, hollow, persistent. Ray flowers 8, pistillate, corollas minute, greenish, densely glandular, scarcely ligulate, stigma branched, papillate. Disk flowers staminate,

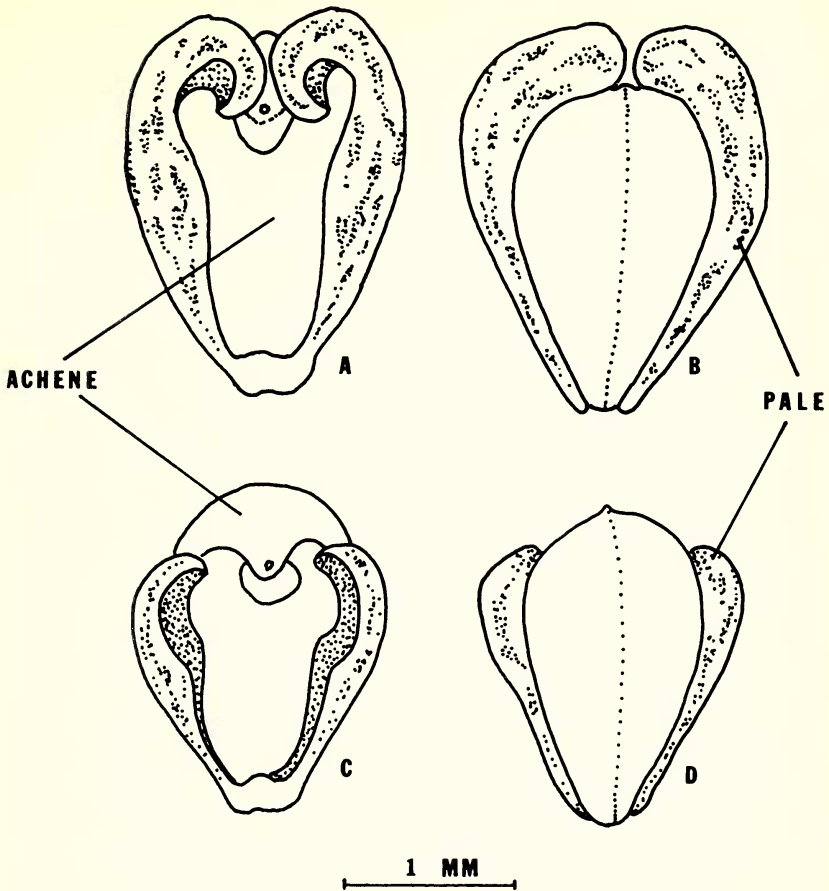


FIG. 2. Comparison of achenes of *P. mollis* varieties. A, ventral view, and B, dorsal view, var. *mollis*; C, ventral view, and D, dorsal view, var. *peninsularis*.

the pistil rudimentary, the corolla five-toothed, actinomorphic, densely pubescent and glandular at the apex, greenish-yellow, stamens 5, loosely coherent, tipped with a deltoid appendage, stigma of the brush type, unlobed, flower shortly pedicellate, the pedicels remaining attached to the receptacle after the dehiscence of the flower. Pollen tricolpate, echinate, yellowish, oblong when dry, columellae branched, foramina absent. Achenes dorsoventrally flattened, obovate, tuberculate, glabrous, sessile, apiculate, falling away at maturity with the pales of the opposed disk flowers. Pappus none on the disk flowers, occasionally represented by a tooth in the ray flower. Hairs of two types; a uniseriate clothing hair and a biseriate glandular hair. Chromosome number  $2n = 18$  II.

#### 1. PARTHENICE MOLLIS var. MOLLIS.

Wings of the achene longer than the body of the fruit.

DISTRIBUTION (fig. 1): Mexico: Sonora, Sinaloa, Chihuahua; United States: southern Arizona (Pima, Santa Cruz, Cochise counties); frequently along washes or amongst boulders having a distinct southern exposure. In Mexico, often along roadsides in disturbed sites where runoff moisture is available. Jul-Aug.

REPRESENTATIVE SPECIMENS: United States: Arizona: Cochise Co.: 2.5 mi SW of Willcox, Sep 1970, *Page s.n.* (ARIZ); Pima Co.: S end of Coyote Mts., 18 Nov 1960, *Barr and Goodding 60-385C* (ARIZ); along Alamo Wash, Organ Pipe National Monument, 12 Sep 1943, *Clark 11015* (GH); Toro Canyon, Baboquivari Mts., 29 Aug 1931, *Gilman 55* (ARIZ); Baboquivari Mts., 27 Dec 1935, *Goodding 9140?* (ARIZ); W side Mt. Baboquivari, 6 Oct 1944, *Gould, Darrow, and Haskell 2683* (ARIZ, CAS, UC); lower part of Baboquivari Canyon, 15 Aug 1926, *Peebles, Harrison, and Kearney 2790* (ARIZ); Box Canyon, Santa Rita Mts., 27 Aug 1964, *Reese 1* (ARIZ, CAS, ASU); Sabino Canyon, Santa Catalina Mts., 29 Aug 1964, *Reese 2* (ARIZ, CAS, ASU); Redington Pass Road, southern tip of the Santa Catalina Mts., 2 Sep 1964, *Reese 3* (ARIZ, ASU, CAS, UC); Brawley Wash, Baboquivari Mts., 19 Sep 1964, *Reese 6* (ARIZ); one mi S of Tubac, 2 Oct 1964, *Reese 7* (ARIZ, ASU, CAS, UC); Wild Burro Canyon, Tortolito Mts., 25 Oct 1964, *Reese 12* (ARIZ, ASU, CAS, UC; \*greenhouse—Univ. Arizona, from seed from Redington Pass, 17 Jul 1966, *Reese 168* (ARIZ, UC, CAS); near Pacing Horse Ranch, Canyon del Oro, Santa Catalina Mts., 9 Aug 1966, *Reese 171* (ARIZ, ASU, CAS, UC); Pontatoc Wash, foothills Santa Catalina Mts., 7 Aug 1968, *Reese 208* (ARIZ, ASU, CAS); Canyon del Oro, corner of Tangerine Road and the Oracle Hwy, 25 Aug 1968, *Reese 212* (ARIZ, ASU); seedlings, near Canyon del Oro, Pacing Horse Ranch, 7 Feb 1969, *Reese 213* (ARIZ, ASU); Fort Lowell, 10 Sep 1903, *Thorner s.n.* (ARIZ); Stone Cabin Canyon, Santa Rita Mts., 12 Sep 1903, *Thorner 130* (ARIZ, CAS, DS, UC); Santa Cruz Co.: road to Lochiel, Patagonia Mts., 2 Oct 1964, *Reese 8* (ARIZ, ASU, CAS, UC); Sycamore Canyon, near Ruby, 30 Sep 1944, *Darrow and Haskell 2079* (ARIZ, UC); Patagonia Mts., 24 Aug 1940, *Kearney and Peebles 14821* (ARIZ); Sycamore Canyon, 18 Aug 1968, *Reese 209* (ARIZ, ASU); on dam of Peña Blanca Lake, 18 Aug 1968, *Reese 211* (ARIZ, ASU).

Mexico: Chihuahua: Rio Aros, 23 July 1937, *LeSueur s.n.* (GH, UC); Sinaloa: on hillside roadcut 14 mi N of Culiacan, 29 Aug 1966, *Reese 182* (ARIZ, ASU, CAS, UC); Maraton, 12 mi W of Culiacan, Aug 1944, *Gentry 7059* (GH); Palmar, 50-70 mi N of Guamuchil, 22 Aug 1941, *Gentry 6102* (ARIZ, DS); Ymala (Imala), 16-25 Aug 1891, *Palmer 1430* (ARIZ, DS, UC, GH); \*1.3 mi E of Cofradía, 25 Aug 1973, *Stuessy and Gardner 3038* (OS); Sonora: 31 mi S of border on Hwy 15, 23 Aug 1966, *Reese 172* (ARIZ, ASU, CAS, UC); first wash S of police station, Santa Ana, 23 Aug 1966, *Reese 173* (ARIZ, ASU, UC); 10 mi S of Benjamin Hill, along Hwy 15, 23 Aug 1966, *Reese 174*

(ARIZ, ASU, CAS, UC); 5 mi S of Oasis, 23 Aug 1966, *Reese 175* (ARIZ, ASU, CAS, UC); along road to Ures, 24 Aug 1966, *Reese 176* (ARIZ, ASU, CAS, UC); 36 mi W of Cananea, 24 Sep 1966, *Reese 183* (ARIZ, ASU, CAS, UC); 30 mi S of Hermosillo, 24 Aug 1966, *Reese 177* (ARIZ, ASU, CAS, UC); along Hwy 15, 60 mi S of Guaymas, 26 Aug 1966, *Reese 179* (ARIZ, ASU, CAS, UC); S of Santa Cruz, 2 Oct 1964, *Reese 11* (ARIZ, CAS, UC); La Matancita, 1 mi W of El Tigre, 30 Aug 1941, *White 4164* (ARIZ); Horconitos, Arroyo del Salto, 6 Sep 1940, *White 3786* (GH); Rio Bavispe, 30 Aug 1941, *White 4164* (ARIZ, GH, UC); 12 mi S of Imuris, 24 Sep 1966, *Reese 184* (ARIZ, CAS, UC); Puerto de Huepari, NW of Aribabi, Rio Bavispe, 7 Sep 1939, *White 2771* (GH); San Bernardo, Rio Mayo, 24 Aug 1935, *Gentry 1622* (ARIZ, GH, UC); Santa Cruz, 1834, *Thornber 947* (UC); along stream where road from Alamos to San Pedro crossed the stream, 30 Jul 1969, *Mason 2916* (ARIZ, CAS, UC); \*8.4 mi S jct rte 15 and road to Querobabi, 22 Aug 1973, *Stuessy and Gardner 3007* (OS).

2. *Parthenice mollis* var. *peninsularis* Sauck, var. nov. TYPE: Mexico, Baja California Sur, "La Laguna", hills east of La Paz; margin of a large rain basin, *Parkinsonia* association, 31 Mar 1949, *Annetta Carter 2615* (Holotype:UC; Isotype:GH).

Differt a var. *mollis* alis achenii fructificatione brevioribus. Plantae limitae ad Californiam Inferiorem.

Differs from var. *mollis* in that the wings of the achene are shorter than the body of the fruit.

DISTRIBUTION (fig. 1): Moist arroyo margins, hillsides and slopes, dry lake bottoms; Baja California Sur: Tres Vírgenes north of Santa Rosalía, south to La Paz and Santiago in the "Cape" region. Feb–Apr.

REPRESENTATIVE SPECIMENS: Mexico: Baja California Sur: SW side of Tres Vírgenes, 6 Mar 1935, *Wiggins 9727* (DS, UC); San Gregorio, 1 Feb 1889, *Brandeggee s.n.* (UC); 13 mi W of Canipole, 16 Mar 1935, *Shreve 7112* (DS, ARIZ); Las Cuevitas, below Comondú, 17 Feb 1939, *Gentry 4233* (DS, UC); camp and hillsides near Comondú, 26 Apr 1931, *Wiggins 5491* (CAS, DS, GH, UC); side arroyo heading into Mesa San Alejo, SW of Rancho El Horno, 13 Mar 1960, *Carter and Ferris 3767* (UC); broad arroyo N of San Javier, 29 Sep 1965, *Carter 5050* (UC); Los Dolores, Apr 1892, *Bryant s.n.* (UC); Arroyo Quisapol, E of La Presa along trail to Laguna Caquihui, Sierra de la Giganta, 18 Nov 1959, *Wiggins 15560-A* (DS); La Paz, 20 Jan–Feb 1890, *Palmer 66* (GH); La Paz, 2 Feb 1890, *Brandeggee s.n.* (UC); Santiago, *Jones 24626* (UC).

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**OCCURRENCE OF OAKS IN LATE PLEISTOCENE VEGETATION IN THE MOJAVE DESERT OF NEVADA.**—The nature of Pleistocene environmental change in Southwestern deserts is not well known. Quaternary fossil plant remains comparable to those found in eastern North America were thought to be non-existent in these deserts until Wells and Jorgensen (Science 143:1171-1174. 1964) reported that ancient wood rat middens are sources of abundant plant material. Modern wood rats (*Neotoma* spp.) gather most of the plant material found in their middens within thirty meters of the site (R. B. Findley, Univ. Kans. Publ. Museum Nat. Hist. 10:514-523. 1958.), and fossil middens presumably also represent strictly local vegetation. Studies of such remains, together with advances in palynology, are providing evidence that changing vegetation has greatly altered the desert landscape during the last 40,000 years.

Two species of oaks, *Quercus chrysolepis* and *Q. dunni*, not previously reported in late Pleistocene vegetation of the Mojave Desert, were found by the author to be present in ancient wood rat middens located in the Newberry Mountains, south of